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SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/479,211	06/07/95	OHTANI H	0756-1363

D1M1/0927

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EXAMINER	
RADOMSKY L	
ART UNIT	**PAPER NUMBER**
1104	

DATE MAILED: 09/27/96

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents

Office Action Summary

Application No.	Applicant(s)
08/479,211	Ohtani et al.
Examiner	**Group Art Unit**
Leon Radomsky	1104

☒ Responsive to communication(s) filed on *Jul 9, 1996*.

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-18* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-18* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____.

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 16-18 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Forming transistors in areas where the carrier direction is perpendicular to the direction of lateral crystallization is new matter. The specification only has support for forming transistors in areas where the carrier direction is parallel to the direction of lateral crystallization.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> > (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1-3,7-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhang et al. (US '772). Zhang teaches forming a 500Å a-Si film in contact with a silicon nitride cover film, disposing a continuous catalyst layer in contact with said a-Si and thermally crystallizing said a-

Si such that the catalyst is laterally diffused throughout said a-Si and forming TFTs in in areas of said crystallized Si where the carrier direction is parallel to the direction of lateral crystallization (Embodiment 4, Fig. 7). Thereafter, said crystallized silicon was irradiated with light to improve its crystallinity (Col. 17, Lines 25-30). Said light could be a lamp or laser light (Col. 13, Lines 50-52).

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-3,7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hultman et al. (J. Appl. Phys.) in view of Yonehara (US '093) or Shibata (US '224) or Fuse et al. (Sol. St. Phenom.).

Hultman teaches forming an a-Si film in contact with a silicon nitride substrate, disposing a continuous catalyst layer in contact with said a-Si and thermally crystallizing said a-Si such that the catalyst is inherently diffused throughout said a-Si. Hultman does not teach laser or lamp irradiation after the thermal crystallization.

Yonehara teaches that lamp annealing of nitride capped, thermally crystallized polysilicon increases the grain size and removes intergrain defects (Col. Lines 10-30).

Fuse teaches that laser annealing of thermally crystallized polysilicon removes intergrain defects (Abstract).

Shibata teaches that polysilicon resistivity is reduced if a laser anneal is applied after a thermal anneal (Abstract).

Therefore, it would have been obvious to one of ordinary skill in the art to add an extra light irradiation to the process of Hultman in order to increase the Si grain size, remove intergrain defects and to reduce the Si resistivity, as taught by Yonehara, Fuse and Shibata.

6. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hultman in view of Yonehara or Fuse or Shibata as applied to claims 1-3, 7-9 above, and further in view of Caune et al. (Appl. Surf. Sci.). Hultman et al. do not teach preheating a substrate during layer irradiation.

Caune teaches laser annealing a-Si in contact with a metal catalyst which was preheated to 280 C (Page 602) in order to lower the crystallization temperature and increase the diffusion rate of the catalyst (Abstract, Page 597).

Therefore, it would have been obvious to one of ordinary skill in the art to preheat the substrate of Hultman et al. during layer annealing in order to increase the diffusion of the catalyst as taught by Caune.

7. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (US '772) in view of Caune et al. (Appl. Surf. Sci.). Zhang does not teach heating the substrate during laser irradiation.

Caune teaches laser annealing a-Si in contact with a metal catalyst which was preheated to 280 C (Page 602) in order to lower the crystallization temperature and increase the diffusion rate of the catalyst (Abstract, Page 597).

Therefore, it would have been obvious to one of ordinary skill in the art to preheat the substrate of Zhang during layer annealing in order to increase the diffusion of the catalyst as taught by Caune.

8. Claims 1-3, 7-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (US '772) in view of Zhang et al. (US '121). Zhang (772) does not teach forming TFTs in areas where the carrier direction is perpendicular to the direction of lateral crystallization.

Zhang (121) teaches that pixel TFTs should be formed in areas where the carrier direction is perpendicular to the direction of lateral crystallization in order to lower their leakage current, while driver TFTs should be formed in areas where the carrier direction is parallel to the direction of lateral crystallization in order to increase their operating speed (Abstract and Col. 5, Lines 48-65).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a certified translation of said papers has not been made of record. See MPEP § 201.15.

Therefore, it would have been obvious to one of ordinary skill in the art to form the pixel TFTS of Zhang (772) in areas where the carrier direction is perpendicular to the direction of lateral crystallization in order to reduce their leakage current as taught by Zhang (121).

Double Patenting

9. The non-statutory double patenting rejection, whether of the obviousness-type or non-obviousness-type, is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent. *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); and *In re Goodman*, 29 USPQ2d 2010 (Fed. Cir. 1993).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(b) and (c) may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.78(d).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 1-3,7-15 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-56 of U.S. Patent No. 5,529,937. Although the conflicting claims are not identical, they are not patentably distinct from each other because said claims 1-56 contain every limitation of claims 1,3,7-15 except the laser type used, TFT formation and contact of a-Si with SiN. However, the motivation to add said details is provided in the specification of 5,529,937 (Fig. 1D, Col. 11, Lines 42-45, Col. 11, Lines 50-55).

Please note that claims 1-55 of 5,529,937 were distinguished from the prior art of record because they contained a limitation that amorphous areas were left after the thermal anneal and

that the laser anneal was performed to crystallize said remaining areas. No such limitations are found in claims 1-18 of the present application.

Response to Arguments

11. Applicant's arguments and amendments have been deemed sufficient to overcome the previous Obviousness Double Patenting rejection of claim 1 over Ser. No. 08/391,580. Said rejections are withdrawn. However, the amendment necessitated a new Obviousness Double Patenting rejection over 5,529,937

12. Applicant's arguments filed 7-9-96 have been fully considered but they are not persuasive.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. *In re McLaughlin*, 443 F.2d 1392; 170 USPQ 209 (CCPA 1971).

With respect to the combination of Hultman with Yonehara or Fuse, the catalyst element of Hultman would inherently be dispersed throughout the silicon layer after the thermal annealing step taught by Hultman. Therefore, when lamp or laser light of Yonehara or Fuse is irradiated on

the silicon layer of Hultman in order to improve its crystallinity, the catalyst is already diffused in said silicon layer.

Applicants rely on *In re Mahukar Patent Litigation* and *In re Fritch* for the proposition that "unless the prior art itself suggests the particular combination, it does not show that the actual invention was obvious or anticipated". However, in the instant case, the prior art itself does suggest the particular combination claimed. Yonehara and Fuse teach that an extra lamp or laser irradiation of thermally recrystallized polysilicon, such as the that of Hultman, enhances crystallinity of the polysilicon. This is the exact motivation taught in claim 1 for irradiation of the already crystallized silicon.

The situation here is more analogous to *In re Dillon*, 16 USPQ2d 1897 (Fed. Cir. 1990) (*en banc*) than to *In re Fritch*. In *Dillon*, the appellants claimed a fuel with an amount of terta-orthoester sufficient to reduce particulate emissions. The claims were rejected over a primary reference which taught a fuel containing tri-orthoesters to scavenge water in view of secondary references which taught equivalence between tri- and terta-orthoesters as water scavengers. The majority of the Court of Appeals for the Federal Circuit held that as long as the prior art provided motivation to combine the references, a prima facie case of obviousness was established notwithstanding the newly claimed use, because the fuel taught in the combination of references would inherently possess the ability to reduce particulate emissions as well as to scavenge water. Thus, a claimed invention possessing properties that would be inherent in a proper combination of prior art references is not necessarily unobvious. *See also In re Swinehart,* 169 USPQ 226,229

(CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Noguchi (US '786) teaches preheating a substrate during a laser anneal.

This office action has been created under the Patent and Trademark Office Semiconductor Technology Quality Assurance Pilot Program. It incorporates the examination quality standards set as a result of customer focus sessions with the semiconductor industry. The listing of the field of search to follow is one of these standards.

Field of Search	Date
U.S. Class and subclass:148/Dig. 16, Dig. 90 437/21,40TFT,TFI,41TFT,TFI,88,173,174,233	2/96 9/96
Other Documentation:	
Electronic data base(s):	

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Leon Radomsky** whose telephone number is (703) 305-3445.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661. Group 1100 fax number is (703) 305-3600.

CHARLES L. BOWERS, JR.
SUPERVISORY PATENT EXAMINER
GROUP 1100

LR

9/17/96